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Methods of Measuring the Demand for and Value of

OUTDOOR RECREATION

By

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AUTHOR'S PREFACE TO THIRD PRINTING (December 1970). I ask the reader to accept this eleven-year-old reprint as a pioneer exploration of an important and difficult subject, rather than to judge it as an up-to-date and complete analysis. If I were writing this piece today, with the benefit of what I have learned from my own studies and from those made by others, I would make at least the following changes or amendments:

1. I would develop more fully the concept of the whole outdoor recreation experience, as Jack L. Knetsch and I did in *Economics of Outdoor Recreation* (Baltimore: The Johns Hopkins Press, 1966) or as I did in *Land and Water for Recreation* (Chicago: Rand McNally and Company, 1963. Out of print).

2. I would apply more carefully the concept of consumer's surplus, as this has been developed in economic literature generally, to the demand for outdoor recreation, and would show more carefully the usefulness of the area under the demand curve for natural resource planning.

3. I would stress the similarity of demand analysis for outdoor recreation, where the total market is stratified geographically, with demand analysis for goods and services, where the total market is stratified on a time basis.

4. I would use my (admittedly imperfect) data on national park visits and costs differently; in particular, I would not assume that the visit to the park was

(Continued on inside back cover)

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OUTDOOR RECREATION

By MARION CLAWSON

For several reasons, in recent years there has been a greatly increased interest in the measurement of demand for and value of outdoor recreation. At the same time, there has been a general dissatisfaction with the existing state of knowledge and methods of analysis. This statement is offered in that hope that it may contribute to a better understanding of several important related issues affecting outdoor recreation.

The use of outdoor recreation has been increasing rapidly for many years. For the period since the war, the rate of increase from year to year has run around 10 per cent for many types of areas—higher for some, lower for others.[1] Where records are available for comparatively long periods, it is evident that this rate of increase has been operative for many years. Thus, both national parks and national forests show growth curves approximating this rate. During the war, under the impact of gasoline rationing and other travel restrictions, use of the more distant areas fell off sharply. But use does not decline sharply during depression, and in some minor depressions and for some types of areas it has actually continued to increase, though at a slower rate. The major factors behind the persistent, steady, relatively rapid rise in use of outdoor recreation areas have been increased total population, higher real incomes per capita, greater leisure, and more travel. Since each of these factors is expected to show higher values for the future than today, the trend toward still greater use of outdoor recreation areas presumably will continue. Thus far, there is no evidence at all of a slackening in the rate of growth; at some future date, presumably the growth curve will begin to flatten out, but there is no sign of that now.

The competition for land and water resources for all major

[1] Marion Clawson, *Statistics on Outdoor Recreation* (Washington: Resources for the Future, Inc.), April 1958.

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uses is also increasing. After all, the area of land and the volume of water are essentially fixed, although their usefulness can be increased through capital investment and in other ways. The proper role of recreation as a user of land and water, or as one use in a multiple-purpose program for either, is not easy to measure. In the case of water developments particularly, but also to a degree in management of land, it is customary to measure the economic or monetary gains and costs of each use of land or water. If this process is to be carried to its conclusion, and if recreation is to be considered in the same manner as alternative uses of the resources, then a value must be put on the amount of recreation provided.

If we could place an accurate and acceptable value on outdoor recreation, this would be valuable in resource management in several ways. First of all, it would provide a means for comparing the importance of recreation with that of other uses of the same resources—water in multiple-use water projects, land under multiple-use management programs. As I shall point out later, factors other than comparative values might well be decisive in decisions about use of resources, yet such values would be helpful. Secondly, the value of the recreation to be provided by a proposed recreation project, such as a new park, would provide one measure of the desirability of making the necessary investment in the project. Thirdly, the value of the recreation would provide a ceiling to any fees that might be charged for its use. An accurate estimate of the demand for recreation, in the economist's sense of the term, would permit advance estimates of the level of entrance fees which would just pay operating and maintenance costs, if it were desired to charge fees at this level. Other uses for accurate and detailed estimates of values of recreation probably exist also.

It is for the foregoing reasons that there has been a good deal of pressure for the development of monetary measures of the value of outdoor recreation. Many arguments can be advanced in favor of such a process.[2] The chief argument is that any reasonable estimate of value is better than none at all. Those who advance this argument assume that recreation must in some way be compared, and the more directly the better, with other land and water uses. They argue that not placing a value on recreation is, in this context, equivalent to placing a zero value on it. It might be pointed

[2] Albert M. Trice and Samuel E. Wood, "Measurement of Recreation Benefits," *Land Economics*, Vol. XXXIV No. 3, August 1958. See also the discussion of their article in the succeeding issue of the same journal.

out to those who maintain this position that an estimate which was more than twice the true figure—however the latter is defined—would introduce more error than a zero figure. But there is considerable merit in the position that rational planning of resource development requires a value on recreation wherever it is one of the major uses of land or water.

On the other hand, many have argued against trying to place specific monetary values on outdoor recreation. Arguments against trying to put a value on outdoor recreation fall into two general categories: (1) it can't be done,[3] and (2) it is undesirable to try.[4] Those who argue that an accurate value cannot be put on outdoor recreation may base their objections on theoretical or practical grounds. Some argue that the whole valuation process is inapplicable to essentially subjective experiences. They will ask how one can put a value on the unique and highly personal experience of viewing the Big Trees or the Grand Canyon or some other outstanding spectacle for the first time. They will stress the unique character of such experiences, their emotional content, their intensely personal character, and argue that placing a monetary value on such experiences is a little like placing a monetary value on a mother's love for her child. The present author has found some of the statements about the best outdoor areas and their values, reminiscent of the statements made by the early economists who strove to explain the value of goods such as rare pictures, which had a value but provided no tangible service. Those who argue against monetary valuation of subjective experiences overlook the fact that we do this all the time, not only for such exotics as masterpieces of painting but also for schooling, medicine, and many other aspects of life.

A different type of argument is also employed against monetary values for outdoor recreation—namely, that the practical difficulties of measuring value are too great, even if the theoretical difficulties are solved. Surely something must be conceded to this viewpoint; it would probably be difficult to get fully satisfactory

[3] This is essentially the conclusion of the most formal study of the subject to date: Roy A. Prewitt, *The Economics of Public Recreation - an Economic Study of the Monetary Evaluation of Recreation in the National Parks*, National Park Service, Department of the Interior, 1949. ". . . there is no acceptable standard of evaluation that can be used to place a monetary value on recreation that is not arbitrary." (P. 27).

[4] That the record may be clear, let me admit that I took essentially this position in *Uncle Sam's Acres* (New York: Dodd, Mead, 1951).

data on which to measure the value of outdoor recreation. But perhaps these difficulties have been exaggerated.

The second major argument against trying to place a monetary value on outdoor recreation is that it may be unwise to compute specific monetary values for something on which the major decisions will be, or should be, based on other grounds. Those who support outdoor recreation as a healthful activity—or as a socially necessary one—would deny that the monetary values should be the chief criterion, no matter how accurately such values could be defined and measured. They would support certain areas for certain types of outdoor recreation, regardless of monetary values, and could surely cite strong arguments for their position. In this regard, such advocates of outdoor recreation are in a position analogous to those who support universal education—while its value may be great, exceeding its cost, the real arguments for it are different, and not much conditioned by estimates of monetary value.

The major premise of this paper is that it is both theoretically possible and practically manageable to put monetary values on outdoor recreation. The conceptual and theoretical problems, while somewhat novel, are not insurmountable nor perhaps unusually difficult; the problem of getting accurate and dependable data is serious, but still manageable. On the other hand, while such monetary valuation can be useful for sound resource planning, too heavy reliance should not be placed upon monetary values. In our modern affluent society, we both can and should concern ourselves with the composition of our economic output as well as its amount, and with the kind of society we fashion for ourselves to live in. In this regard, outdoor recreation may be in the same category as education, health, and several other major aspects of our modern society.

Some Common Concepts Applied to Outdoor Recreation

Before attempting to measure the net rent or value of the recreation opportunity as such, let us examine four concepts applied more or less frequently to outdoor recreation. They are:

1. The gross volume of business generated by reason of the outdoor recreation opportunities. Estimates of this amount have been made in many instances, are widely popular, and even have been used as in some way, usually indefinitely, related to the value of the recreation opportunity itself.

2. The value added by local business, in the above estimated gross expenditures. Since only part of the gross expenditures represent a local contribution, an obvious step is to try estimating the part of total expenditures which represents local economic activities.

3. The demand for outdoor recreation, in the strict economic sense of the word "demand." This should measure a willingness of users to pay measurable or definable sums of money for specified volumes of outdoor recreation.

4. Consumer's surplus arising from specific outdoor recreation opportunity. When some people get recreation free or at low cost, when they would be willing to pay relatively large sums rather than do without it, then some measure of consumer surplus exists. How may it be defined more precisely, and how measured?

We shall now examine each of these concepts in greater detail, to see more exactly what each tries to measure, how each may be estimated, and what usefulness each may have if accurately estimated.

Gross Volume of Business from Recreation

People who partake of outdoor recreation, especially that located relatively long distances away from their homes,necessarily spend money in so doing. These expenditures are for many purposes, and are likely to be made in many places. Estimates of such gross expenditures have been made by many groups—those interested in travel to national parks, those interested in travel of all kinds, those interested in tourist promotion within specific states or districts thereof, local Chambers of Commerce, and many others.[5] The same approach has been used for specific types of

[5] *Yosemite National Park Travel Survey,* National Park Service, California Division of Highways, and Bureau of Public Roads, 1953; *Glacier National Park Tourist Survey,* Montana State Highway Commission, Bureau of Public Roads, and National Park Service, 1951; *Grand Canyon Travel Survey,* Arizona Highway Department, Bureau of Public Roads, and National Park Service, 1954; *Shenandoah National Park Tourist Survey,* Virginia Department of Highways, National Park Service, and Bureau of Public Roads, 1952; *Vacation Survey, Rogue River Basin,* National Park Service, 1950; *The Great Smoky Mountains National Park Travel Study,* North Carolina State Highway and Public Works Commission, Tennessee State Department of Highways and Public Works, and United States Bureau of Public Roads, 1956; *Americans on the Highway, A Report on Habits and Patterns in Vacation Travel,* American Automobile Association, sixth edition, 1956; *The Travel Market among U. S. Families with*

outdoor activities, such as fishing and hunting.[6]

Such estimates of gross expenditures for outdoor recreation are very popular, in many quarters. For one thing, they are likely to yield large figures, even if accurate—and they have at times been suspected of exaggeration. If one can say that the tourist business leads to the expenditure of billions of dollars within a the state, and that this sum is exceeded only by the gross output of automobile manufacture, or farming, or some other activity, then one is likely to be able to impress most listeners with the importance of the tourist business. Such large figures are likely to give the impression of a large and profitable business. Indeed, this is one of their chief purposes. If visitors to Y national park spent Z millions of dollars in such visits and the trips necessary thereto, then Y national park must be an important part of the economic life of the state in which it is located.

Such gross expenditure estimates have at times been used in planning multiple-purpose water developments, as an indication of the value of the recreation opportunity provided by the specific projects. It has been argued that those persons making such expenditures must have gotten value received, or they would not have made them, and especially would not have continued to do so year after year. If the gross value of recreation was M millions of dollars, while the gross value of electric power produced was N million dollars, then the ratio of M to N somehow suggests the relative importance of the two.

But no one can be very happy about these estimates of gross expenditures on recreation. They are probably subject to considerable error of estimate, but a more important limitation is their meaning. In the first place, it is obvious that not all the reported expenditure is actually new or increased expenditure—some of it is merely "credited" here when otherwise it would have shown up somewhere else. Food bought while on vacation, for instance, re-

Annual Incomes of $5,000 or More, Research Department, The Curtis Publishing Company, 1955; and *How States Find Out About Their Tourist Trade,* by Robert S. Friedman, Bureau of Governmental Research, University of Maryland. These are only some of the references that have come to the author's attention; many others exist, especially for local areas and of an informal kind.

[6] *National Survey of Fishing and Hunting,* Fish and Wildlife Service, Department of the Interior, Circular 44, 1955; and *An Evaluation of Wildlife Resources in the State of Washington,* by Robert F. Wallace, Bulletin No. 28, Bureau of Economic and Business Research, State College of Washington, 1956. This latter publication lists and analyzes some eight other publications in this general field.

places food that would otherwise have been bought at home. In total, of course, it might be argued that people would have spent as much of their total incomes if they had not gone to enjoy outdoor recreation as they did while enjoying it. But, even within categories, expenditures associated with the outdoor recreation experience are not new or additional, but rather to a greater or lesser degree are substitutes.

In the second place, whatever may be the amount of the total expenditure, and whether it is all new or partly substitute, the full effect of the expenditure is not felt in the area where the outdoor recreation opportunity lies, in many cases. Some of what the family spends will be spent in its own home community. Food, gasoline, and most other items are often bought in the home community. Perhaps a boat will be rented at the park, or other minor expenditures made there. But it is precisely because expenditures for this type of recreation are typically not made in the local area, that units of local government are often unenthusiastic over hordes of outside visitors to a local recreation attraction. Moreover, of what is spent in the local area, much must in turn be spent outside to buy the goods or service sold to the vacationer.

Although the gross expenditure estimates have their greatest appeal as an indicator of total business opportunity, it is not possible to go from them to any firm estimate of the volume and incidence of local business created thereby.

Another serious shortcoming of the gross expenditure data is the lack of comparablity between them and estimates of gross output in other activities, especially other activities related to the same resources. If the gross expenditures by vacationers were equal to the gross value of the output of electric power, for instance, one could not thereby assume that each was equally significant in any economic sense. However, the inputs of labor, capital, management, other production materials, etc., might be greatly different in the two cases. The gross output of a highly integrated industry is not directly comparable with that of an industry which typically buys most of its production materials in a highly fabricated state. The beef cattle feeder who buys both feeder steers and feed, for instance, has a very high volume of business; yet his net income, and his contribution to the national product, may be no greater than that of a dairy farmer who produces all his feed, and has a gross volume of business only one tenth as great. Gross volume data are useful, if at all, only for comparisons with other business of a closely similar structure.

Value Added by Outdoor Recreation Expenditures

An obvious refinement of the gross expenditure approach is to employ the device used to measure the economic output of many industries—the value added by the particular industry or plant. This approach recognizes that part of what a business receives for its product must be spent for raw materials and finished or semi-finished production materials. The costs of these are deducted from gross output; the difference is the value added by the plant or industry, by use of labor, capital, managerial ability, etc. A summation of value added by industries or regions will give a reasonable total for a nation, whereas a summation of gross business involves a major degree of double counting.

For outdoor recreation, this approach would deduct what had to be spent by the supplier of the vacationist services in order to get the materials to make such a service possible. For instance, the service stations in a local area do contribute some value added to the recreationist's expenditures, even though much of what he spends for gas must be sent outside the locality to buy gasoline. Similarly, the local grocery store earns part of what the vacationer spends, by buying at wholesale and providing the usual range of retail services. The same process applies to all other aspects of the recreation expenditures.

Use of the value-added approach would at least localize the impact of the gross expenditures made by those seeking outdoor recreation. One could then say that so and so much was spent by vacationers and used to support business and payrolls within the town, county, state, or region in question. The value added by the recreation "industry" obtained in this way could reasonably be compared with value added by other industries, or from other uses of the same land and water resources. On the other hand, even value added would not deal directly with the value of the recreation opportunity as such, as we shall point out below.

The value-added approach has been used in one unpublished New Mexico study.[7] By means of questionnaires, data were obtained from fishermen as to total expenditures, by classes of goods or services bought, and within the states as well as elsewhere, while engaged in sport fishing in the state. For each type of ex-

[7] A general study of water use in northern New Mexico has been made under the direction of Nathaniel Wollman of the University of New Mexico, by means of a grant from Resources for the Future, Inc. The study is not yet published. An appendix section deals with recreational use of water.

penditure made, estimates were made as to value added within the state for that type of good or service. The authors of this report conclude that their estimates of value added from sport fishing are comparable to estimates of value added in agriculture, mining, or industry; and that these value-added data from different economic actvities can be summed to obtain estimates of gross state output.

Value-added estimates of this kind meet some of the major objections levelled at gross expenditure data. They do indicate the volume of business within the state or local area; they are more directly comparable with similar data from other economic activities. However, it still remains true that these amounts are spent, not for the provision of the recreation opportunity as such, but for the provision of other services connected with the use of the recreation opportunity.

Demand Curves for Outdoor Recreation

While the value-added concept is a distinct improvement over the gross expenditure concept, at least for most purposes, yet even this does not really come to grips with a major problem: what is the outdoor recreation opportunity really "worth" in a price or market sense? For the other alternative uses of land and water, some approximation of a market price is usually calculated and used in the evaluation process, even when value added is estimated. Can we go this one step further, for outdoor recreation?

Let us start with a brief and elementary review of the demand curve of neoclassical economic theory, as shown in figure 1. The data for this are purely imaginary, but along the X-axis I have placed numbers of visits to a specific outdoor recreation area. On the Y-axis are costs of using this recreation opportunity, or prices in the economist's sense. Let us postpone for the present defining what these prices or costs mean. On the basis of this chart, if the cost of the recreation visit is as low as $1.00, then as many as 400 persons will use the area on a typical summer Sunday; as the price rises, the number of persons who will use it declines, until at the point where the price is $4.00, only 100 persons will use it. This is the typical Marshallian demand curve of elementary economic theory.

Let us review for a moment further some of the assumptions which underlie this curve. It is essentially a static concept; it assumes that numbers of people in the tributary area, their incomes,

their means of travel, their tastes as to outdoor recreation, all continue unchanged. A further assumption is that the marginal value of money will remain unchanged, no matter how much of the product or service is bought; that is, that the amounts spent by any single purchaser (user, in this case) will be small enough that he can disregard how large a portion of his total funds he has spent for this product or service. When any of these or other major basic factors change, then the position and shape of the demand curve in turn may change. In this case, we speak of a shift in the curve.

In this illustration, it is most unlikely that the same person would come into the area twice in a single day, especially since entrance fees are typically on a daily basis. But if we were to put the estimates of volume on a seasonal basis, then increased usage of the area could come from a more frequent use by a relatively small number of persons, or by spreading use among a larger circle of people, or by some of both. More volume, in the typical demand curve, thus may mean more intensive use of the commodity by the same people or a widened circle of users.

Economists speak of the elasticity of a demand curve—of the changes in volume purchased relative to the changes in price charged. If the decline in volume is exactly proportional to the increase in price, as in our hypothetical example, then the elasticity is —1.0, and the total sum spent remains constant. In this case, total expenditures are $400 a day, regardless of the price. If the demand were more inelastic, then use would not fall off so much as price was raised, and a relatively high price would bring in more revenue than a low one. On the other hand, if demand were more elastic, then comparatively small increases in price would lead to major shifts in use; raising price would lower total revenue, lowering it would increase total revenue.

Implicit in this kind of demand curve is the assumption that access to the good or service is unimpeded, and that it is only price which limits the volume of goods sold or the number of customers served. On this basis, the last buyer or user would regard the service as worth *to him* only just the amount he had to pay for it. If the price were raised just the least bit, this last purchaser or user would conclude that the good or service wasn't worth the price, and would refrain from buying. Conversely, were the price to be lowered the least bit, another buyer or customer would conclude that the good or service was at last just worth his while, and he would buy. To this last buyer, the price he must pay just meas-

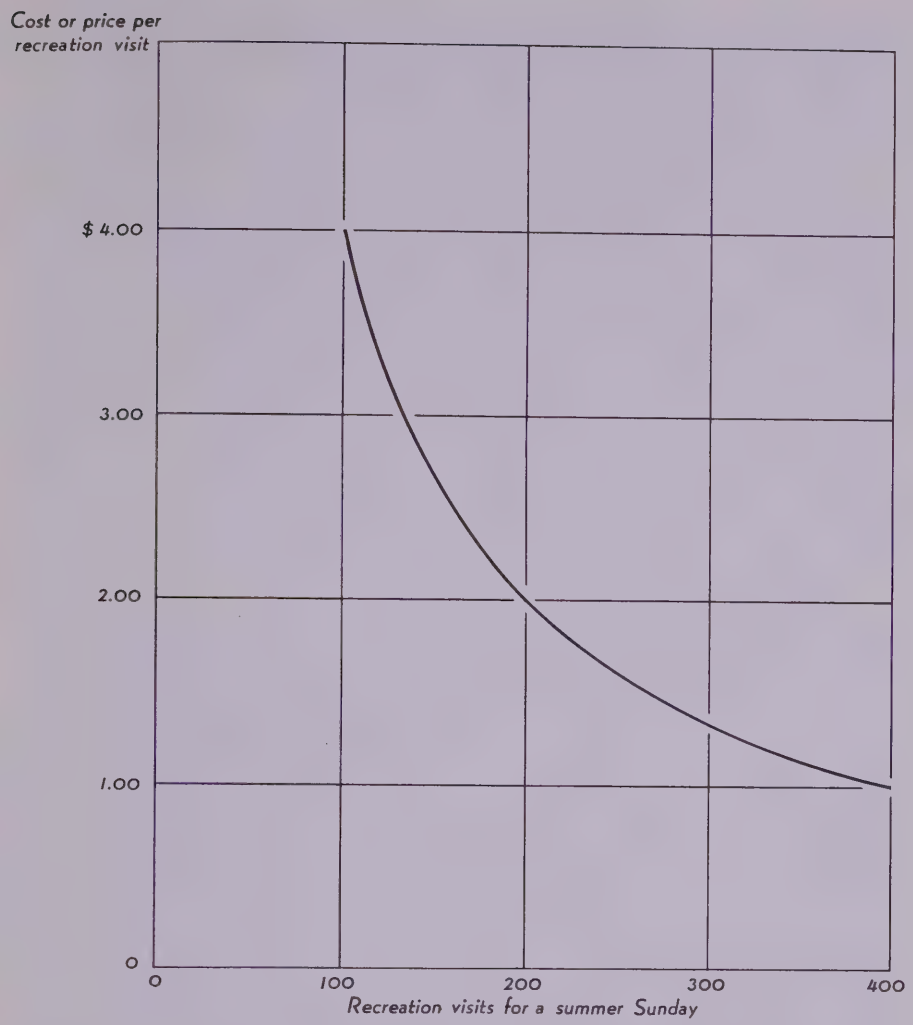

Figure 1. Hypothetical demand curve for an imaginary outdoor recreation area.

ures the satisfactions to him from the good or service; the last drop of utility or satisfaction is needed to make it worth while.

In this economist's use of "demand," it is impossible to conceive of demand by price alone; volume is always a necessary dimension of demand. In our example, the demand for outdoor recreation is not $1.00, nor $2.00, nor $3.00, nor $4.00, nor some intermediate point; it is measured at each of these points, in terms of the number of persons who are willing to pay these prices. Demand, in this sense, is a schedule of volumes or amounts and of prices; it may be possible to express it in mathematical form, either

simply or by a complex formula. The assumptions underlying the schedule, curve, or formula must be spelled out carefully and explicitly, and the effect of changes in any of these factors upon the nature of the schedule, curve, or formula specified if at all possible.

In practice, people use outdoor recreation opportunities to the extent to which they believe their satisfactions are exactly equal to the total costs involved. There is, of course, a considerable measure of ignorance and uncertainty about the process. Some people would use certain areas if they knew of their existence or characteristics; and some make uses which turn out to be more costly that they would knowingly have undertaken for the satisfactions actually received. In practice, only a very small part of the total cost of using outdoor recreation areas is found in the entrance fees charged. In deciding how often, if at all, to go to particular areas, people certainly take into account the free or low entrance fees.

The people who use any particular area for outdoor recreation will incur various costs in doing so—perhaps small ones, perhaps large ones. These costs will be made up on many items, some cash, some on time, others of a more subjective kind. If they continue to use an area, then it is a reasonable assumption that their satisfactions are as great as their costs, and possibly greater in some instances. But, for the marginal user or for the marginal visit by the habitual user, the total costs just equal his estimate of total satisfactions. Were it otherwise, he would have increased his visits or decreased them. To this marginal user or marginal visit, there was no margin above costs. Had entrance fees been raised to a substantial figure, this would have raised the total cost of the recreation experience, and surely would have affected the amount of use made of the area.

The early economists considered certain commodities as "free goods"; they generally put air, sunshine, and water in this class. They recognized that such goods had very great utility for man, yet they were free of cost, for all to enjoy. Later economists pointed out that it was the marginal utility or marginal value of these products which set their price. While some quantity of air is vital for life, beyond a certain point additional quantities of air have no value at all—man has all he can use, and more is valueless. People, acting through their governments, can artificially place a zero value on a commodity, and thus make it a free good. Unlimited supplies of pure wholesome water piped into homes without charge becomes a free good to the user. He is perfectly free to use it in

such quantity that the marginal value is zero. The same can be true of outdoor recreation. If provided in as great a quantity as wanted, free of charge, the recreation opportunity *at the point of supply* becomes valueless in monetary terms. People can use it until the marginal value falls to zero. In fact, this is what seems to have been done. There is nothing left, at the margin, as value for the recreation opportunity as such.

Where the public, acting through various levels of government, has established the price of recreation at zero, or relatively close to it, then use of the area has increased to the point where some users find the satisfactions, in relation to the other costs of using the area, worth zero or close to it. The calculus of the average user is not as precise as has been suggested; yet, in the long run and for the average of many users and potential users, the price of entrance to the recreation area certainly has entered into calculations of cost, and comparisons of cost with probable satisfactions.

How might one go about trying to estimate a genuine demand curve or schedule for outdoor recreation? It has been suggested that prices charged for private recreation of comparable character might provide a guide.[8] However, if the facilities on private land and those on public land were exactly comparable in every respect, including location with respect to users, then no more could be charged by the private owner than the user would have to pay on the public land. As far as the user is concerned, the price on the public areas is a supply price or cost to him, however much it may have been subsidized. Prices (entrance fees) are paid for private recreation areas, while public areas are available free, precisely because they are not fully comparable. The private facilities may not be as crowded, or may be better located, or the improvements may be better; physical similarity of the basic resources is not enough for economic comparability.

Estimation of the demand curve for a recreation area must, we believe, proceed in two stages: one curve for the *total recreation experience,* a second one for the *recreation opportunity per se.* The first can be estimated from the actual experiences of considerable numbers of people engaged in outdoor recreation; the second can be derived from the first.

In general, most outdoor recreation is engaged in by family

[8] If I understand it accurately, this is the approach currently used by the National Park Service in estimating the recreation benefits from water development projects.

groups. This means, first of all, that the family as a whole must consider and decide which, if any, outdoor recreation areas to visit. This involves comparisons between individuals as to their interests and desires—interpersonal comparisons. Their gains from outdoor recreation take the form of anticipations before the experience actually begins, the realization of the experience, and recollections afterward. They need not be equal for each member of the family, nor equal at the time and later. In retrospect, a trip may seem enjoyable which did not seem so at the time, for instance. The experiences might be grouped as those in preparation, in travel to the site, at the site, and in return.

In theory, each family in the United States has the alternative of using every public outdoor recreation area in the entire nation. In practice, of course, its alternatives are much narrower. Many families will know of only a few alternative spots, and perhaps imperfectly of these. Their interests will be conditioned to a major degree by their past experiences. If they have never been camping, for instance, they may be unenthusiastic about doing so for the first time. In addition to their knowledge and their interests, other limiting factors will be the cost of a particular opportunity in relation to what they can afford to spend, and the time they have available. To some extent, time and money are substitutes. With more money, they can afford quicker means of travel and thus reach more distant places, or they may be able to secure a longer vacation. If time is ample, cheaper means of travel may be possible. Travel of some form and distance is ordinarily necessary, and sometimes extensive travel is involved. Should this be regarded as a cost or as a benefit of the recreation experience? Some families may regard it one way, others differently.

The gains from the recreation experience are wholly subjective—attitudes of the various members of the family. If they regard the experience as a whole, or any parts of it, as pleasurable, then they have had a large gain, or "output." On the other hand, another family might regard their experiences as unenjoyable or as only moderately so; then the output of the recreation experience has been less, even though in physical terms it was identical with that of the first family. The costs of outdoor recreation experiences are partly subjective, partly material. Some cash will have to be spent for travel, food, lodging if more than one day is involved, and for other purposes. The use of equipment such as the automobile is usually included also. But there will be some work before, during, and perhaps after the actual recreation ex-

perience. The time and energy spent in travel will be a cost, which may or may not be offset by pleasures from the actual travel experience.

The whole outdoor recreation experience is, to a large extent, a package deal; it must be viewed as a whole, in terms of costs, satisfactions, and time, for all members of the family as a group. It was a consideration of these facts that led to my earlier assertion that demand curves must be derived first for the whole experience.

The demand curve for the whole experience of outdoor recreation, like the demand curves for other services and commodities, is applicable to considerable numbers of people, rather than to individuals. That is, any single individual may have a demand curve that is extreme in some form or other, but a large number of people will have a predictable and measurable reaction to an outdoor recreation opportunity. If we can measure the demand curve for a large group of people, then it is probable that another large group, chosen more or less at random but with similar characteristics to the first group, will respond in similar fashion to costs and other characteristics of the recreation experience. This assumption as to predictability or stability of reaction to similar factors of cost and value is basic to all demand curve analysis, and in fact to all studies of human action. It is an assumption of rationality, not of irrationality of response.

In the discussion which follows certain national parks are used as illustrations because certain data could be found for these parks. The method would work equally well for any outdoor area for which data were available. I shall try to show later that the requisite data could be obtained for any area.

If one is to estimate a demand schedule, some measure of volume is needed. This may be sought in terms of the proportions of a total population which actually took advantage of a known recreation opportunity. Thus, if there were 100,000 people in a city, what proportion of them went to the local city park, what proportion went to the nearest state park, what proportion went to a particular national park? Or, looking at it from the point of the recreation area, what proportion of each 100,000 population in each potential tributary zone visited this particular area? How did the proportion visiting the area vary, depending upon their location and the time and cost of getting to the area? One can estimate a number of participants per 100,000 base population; this is roughly analogous to per capita consumption data for food or other products.

These ideas can be illustrated by the actual available data for Yosemite. In 1953 there were roughly 35,000 visits to Yosemite by people who lived in nearby Merced County (table 1). Since the 1950 Census shows about 70,000 people in the county, there were about 50,000 visits per 100,000 population in that county, that year. This is a measure of volume of this kind of recreation taken by these people. From a group of four counties lying slightly more distant from the park, there were somewhat more than 110,000 visits; however, the population of these counties is much larger, about 640,000, so that per 100,000 of the population there were slightly less than 18,000 visits. Similarly, the numbers of visits and numbers of base population can be calculated for groups of California counties and for groups of states, in each case within rather well-defined distance zones from the park. For each distance zone, based upon certain data contained in the report, and some rather heroic assumptions as to other costs, a total monetary cost figure per visit can be estimated. For the nearby people of Merced County, this averages about $16 per visit; for the distant people of the Atlantic seaboard, it runs to nearly $300 per visit. In addition to this monetary cost, there was a time cost which ran from about one and one-half to over fifteen days per visit. Perhaps the travel was a cost, at least to some people; perhaps to others it was a source of satisfaction.

The data in table 1 are the basic data for a demand curve or schedule—a volume or quantity consumed or bought, and a cost incurred or a price paid. Accordingly, we can plot them and construct an approximation to a demand curve. Because of the very great variation in quantity and a somewhat less but still large variation in price, these data are more clearly presented on double log than on simple arithmetic graph paper (figure 2). The dots for the various distance zones fall into rather regular patterns, for the California counties and for the other states, separately. The correspondence is not perfect, but high. If the curves are valid, then values for intermediate points can be read off. Since our concern is with monetary values, we plot the monetary costs. Under the methods of estimating necessary because of data limitations, money, time, and distance are highly correlated. If more precise data were available, each might be considered separately.

It is clear from the chart that each curve has an elasticity greater than unity for at least part of its length. For the more distant states, the elasticity is close to unity; for the nearer states,

TABLE 1.—Number of Visitors to Yosemite in Relation to Total Population, and Expenditures Per Visit, by Distance Zones

Distance Zones[1]	Average one-way distance[2] (miles)	Population of group of counties or states, 1950 (1,000)	Visits to Yosemite, 1953[3]		Estimated time required to complete a visit[4] (days)	Estimated cost per visit[5] $
			Total number	Per 100,000 of population		
1. Groups of California counties[6]						
less than 100 miles	81	70	35,250	50,500	1.4	16.65
100-150 miles	120	641	114,500	17,850	1.6	20.40
150-200 miles	190	1,588	143,400	9,030	1.95	27.05
200-250 miles	211	1,624	119,400	7,340	2.06	29.05
300 and more miles	350	5,206	245,000	4,710	2.75	42.25
2. Groups of states[7]						
300-500 miles	500	3,120	25,520	824	3.5	66.50
500-1,000 miles	800	5,856	19,030	325	5.0	85.00
1,000-1,500 miles	1,300	14,448	34,610	239	7.5	132.50
1,500-2,000 miles	1,800	38,649	66,450	172	10.0	180.00
2,000-2,500 miles	2,300	32,330	39,750	123	12.5	227.50
2,500 and more miles	2,900	44,910	51,400	114	15.5	284.50

[1] For California counties, calculated from road maps as distance from county seat to valley floor of Yosemite, via west entrance; for other states, airline distances.

[2] For California counties, weighted by total population in each county within group; for other states, estimated on basis of common routes of travel and population distribution within states.

[3] Calculated from data in Yosemite National Park Travel Survey, National Park Service, California Division of Highways, and U.S. Bureau of Public Roads.

[4] Estimated on basis of 1 day per 400 miles of travel plus 1 day in park.

[5] Estimated at average cost of $9.00 per day (reported cost, minus transportation $8.47); plus 10 cents per mile for car for double one-way distance, divided by four on assumption of 4 passengers per car.

[6] Counties in each group are as follows: Merced; Madera, Stanislaus, Fresno, San Joaquin; Tulare, Monterey, Sacramento, Santa Clara, Alameda; San Francisco, San Mateo, Marin, Kern; San Bernardino, Los Angeles, Orange, San Diego. There were no counties, for which data were reported, that were 250 to 300 miles distant.

[7] States in each group were as follows: Oregon, Nevada, Utah, Arizona; Washington, Idaho, Montana, Wyoming, Colorado, New Mexico; North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas; Minnesota, Wisconsin, Iowa, Illinois, Missouri, Kentucky, Tennessee, Indiana, Arkansas, Mississippi, Louisiana; Michigan, Ohio, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Alabama; Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Florida.

much more elastic. It is above unit elasticity for all California counties, and becomes greater for the nearer ones where the costs are lower.

One major assumption entered the calculations of the average cost per visit—that the trip to Yosemite was the chief purpose of the trip, that it should therefore bear the costs of travel from home to the park as well as within the park, and that other sightseeing or recreation on the trip need bear only its direct or marginal cost. More than half of the visitors interviewed stated that the principal reason for their trip was to visit Yosemite, so this assumption is not too far from the fact. Although exact data are missing, presumably the more distant visitors would most frequently include other purposes on their trips, so that if some form of trip cost allocation to different objectives were made, presumably it would be the more distant and costly visits which would be reduced most in price. If so, this might well change the nature of the curve somewhat, to make it more elastic at the low volume—high price end.

In this table and figure, it should be recognized that the nature and the content of the whole recreation experience of which the visit to Yosemite was the crowning goal, differ according to distance from the park. Nearby visitors are able to come in a day or two, are likely to come often, and perhaps derive some of their enjoyment from their familiarity with the scene. Distant visitors require several days to come, usually come only infrequently, and for many it is the first experience with much of their enjoyment deriving from its novelty. But in this respect the demand curve for the whole recreation experience to Yosemite is not unique. The housewife who buys four dozen eggs a week for her family surely uses them in different ways than the housewife who buys half a dozen. One of the common characteristics of a demand curve is that the uses of the commodity change with the volume bought.

It is the contention here that the curve in figure 2 is an approximation to the demand curve of theory *for the recreation experience as a whole.* Although it is referred to as a visit to Yosemite, actually the whole trip from home to the park and back again is included, for time, travel, cost, pleasure. It is a package deal. Yosemite may have been the chief objective, but it is only part of the total experience; it has been only a kind of shorthand that has led me to describe the whole in terms of its chief feature.

The *approximation* aspect of the above statement is emphasized for several reasons. In the first place, the data at my disposal

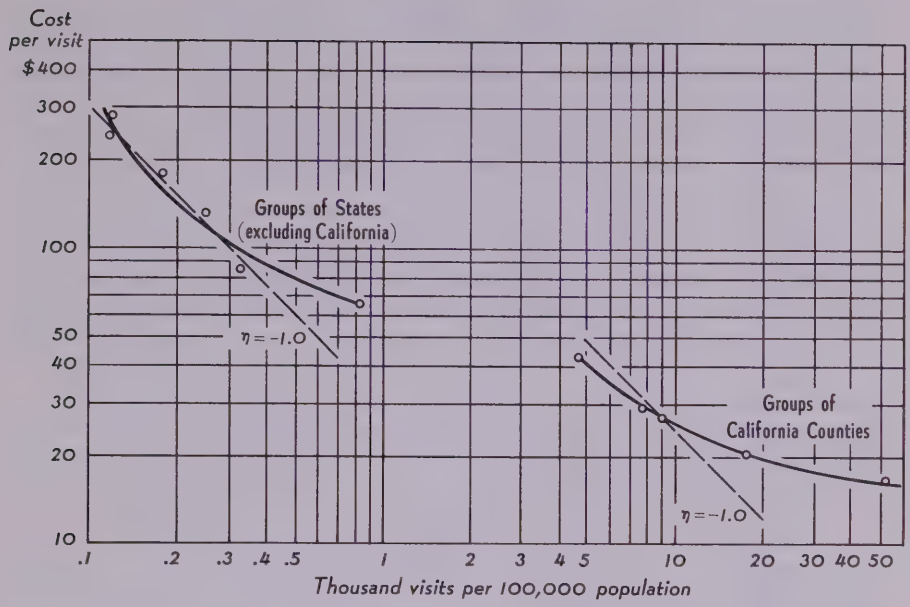

Figure 2. Estimated costs per visit to Yosemite, in relation to number of visits per 100,000 population, 1953.

were faulty for this purpose. It was necessary to make some rather major assumptions about costs of visits from different distance zones; while average costs are about the same as the average costs in the reference source, yet the true relation of distance to cost may be considerably different from what has been estimated. In the second place, it was necessary to make a cost allocation among possible, but largely unknown, other purposes of the trips, which may be at variance with the facts. It was assumed that the visit to Yosemite had to bear all the costs of the trip, allocating to other activities on the trip only those costs additional to the main trip.

The visitors to Yosemite may have made a much different allocation of costs in their own (perhaps subconscious) calculations. In the third place, the population in the various distance zones may differ considerably in terms of average income or of income distribution, as well as perhaps in other socio-economic characteristics. We made no attempt to include this in our calculations. Lastly, the money cost of visiting Yosemite may have not been the only cost involved. If the average visitor regards as onerous the travel experience as such, then distance as such should be entered into the formula. Our estimates of cost were built so directly on distance that there was no sense in trying to isolate the

TABLE 2.—Visits to Specified National Parks Per 100,000 of Base Population, and Average Costs Per Visit

Distance zone	Grand Canyon			Glacier			Shenandoah		
	Visits per 100,000 population	Cost per visit $	Time per visit (days)	Visits per 100,000 population	Cost per visit $	Time per visit (days)	Visits per 100,000 population	Cost per visit $	Time per visit (days)
Up to 100 miles	2,085	63.50	3.5	4,680	42.50	3.5	10,480	9.50	1.0
100 to 300 miles							2,025	15.85	1.3
300 to 500 miles							849	32.15	2.7
500 to 1,000 miles	1,033	116.00	6.0	547	80.00	6.0	428	60.00	5.0
1,000 to 1,500 miles	570	168.50	8.5	241	117.50	8.5	213	99.75	8.3
1,500 to 2,000 miles	402	221.00	11.0	97	155.00	11.0	112	144.00	12.0
2,000 or more miles	207	273.50	13.5	45	192.50	13.5	108	200.20	16.7

influence of distance from our data, but more refined data might permit such measurement. The time required to visit Yosemite might well be a major cost to many potential visitors, and this was not included directly. For many people, time equals money, and vice versa. A paid vacation is one resource, but the opportunity to take additional time without income may also exist. If time is limited, money may permit flying or other time-saving methods. These limitations are those of the data available, not of the method of the analysis. They could be cured by obtaining more precise and relevant data, as will be discussed later. In that case, more refined results would be possible.

The apparent correspondence between cost per visit and number of visits per 100,000 base population may thus include some variables indirectly, and to this extent not represent a pure demand curve showing the net relation between price and volume. However, an approximation such as this may have great empirical usefulness. This is not to argue against making every effort to secure better data, but merely to say that imperfect data may yield usable results.

Generally similar data can be calculated and thus similar total experience demand curves or schedules derived for three other major national parks (table 2 and figure 3). In each case, the dots fall into a rather regular pattern. For Grand Canyon national park, the curve approaches unit elasticity at the end toward lowest costs and largest volumes; there is not the increase in elasticity here that was found for California. The lack of a considerable local residential population may be one explanation. On the other hand, the curve for this park gets much more elastic at the end toward fewer visits and higher costs. The curve for Glacier national park is highly elastic throughout. That for Shenandoah is roughly unit elasticity for the half with lower volumes and higher prices, but gets much more elastic for the higher volumes and lower prices.

Too much significance should not be attached to the precise form, shape, and location of these curves. While data were available on numbers of people by states of origin (by counties within California, for Yosemite), this is a crude measure of the location of their residences. Distances travelled had to be estimated from such general location data; actual road distances may have been different. Average cost for all persons visiting the park was given in the reports, but was usually confined to estimates of costs incurred in or near the park; in no case was it differentiated accord-

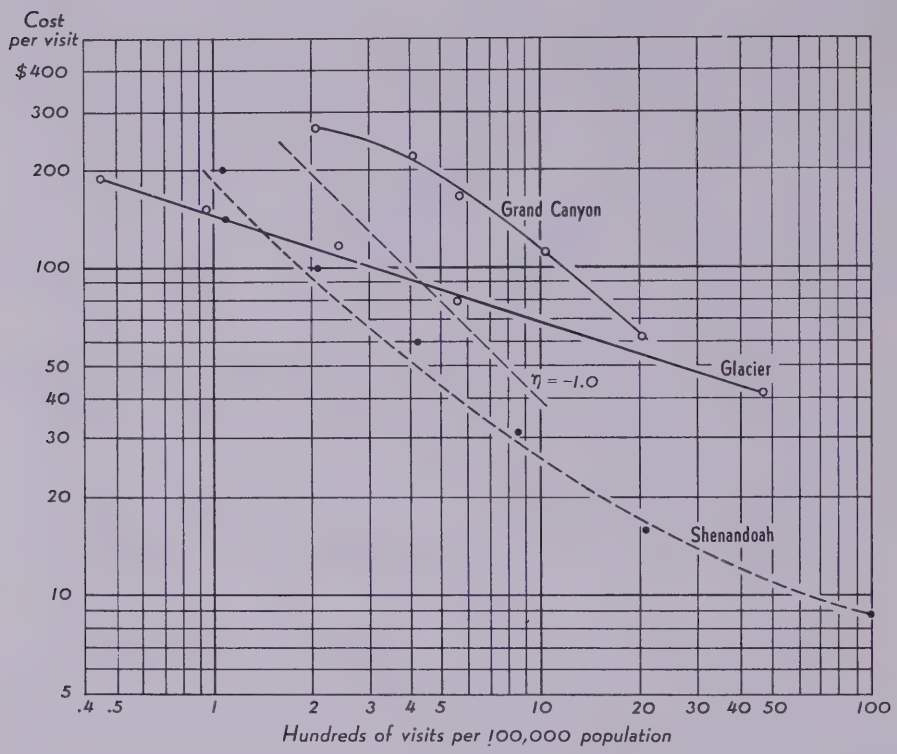

Figure 3. Estimated costs per visit in relation to number of visits per 100,000 of population, Grand Canyon, Glacier, and Shenandoah national parks.

ing to the costs incurrred by the more distant and the nearby visitors. I have estimated the costs per visit from data on average costs per day and on distances travelled. Days involved in travel had also to be estimated. To a lesser extent the numbers of visitors per unit of resident population had to be estimated. Others more familiar with the original studies might have done a more accurate job on all these estimates; perhaps the original data could be tabulated in ways that would answer some of these questions; certainly, studies could have been devised which would have yielded data more directly applicable to the problem. In spite of these limitations, it is possible that the curves do in fact give a reasonable idea as to the nature of the demand curve for these parks for the year in question—one in the early 1950's in each case.

One major discrepancy is apparent in figure 2; the experience for California does not seem to join up with the experience for

other states. There is no logical reason why state boundaries should make any difference. Sufficient detail to calculate a zone of origin between the most distant counties shown in table 1 and the nearest adjacent states was not given in the source report. Had there been a distance zone volume and price for this intermediate area, its dot would have determined the shape of the curve between the two discontinuous curves now shown. There is no logical reason for two separate curves, but there is insufficient data now to bridge the gap with confidence.

The demand curves for these four national parks probably are not at all representative of the demand curves for other types of outdoor recreation areas. These are four of the largest, best known, most popular national parks; some of their use is by persons at relatively great distances. Certainly, relatively commonplace state parks have a very different clientele. And the potential users for the average city park come from an even more closely circumscribed area. However, it is our contention that total recreation experience demand curves such as these could be derived for any outdoor recreation area, given data on numbers of visitors from distance or use zones, statistics on total population within the same zones, and average costs of using the recreation area by people coming in from each zone. The location and shape of the curves might be different than for these outstanding national parks, but the method of estimation may be equally applicable.

It will be noted that no direct mention has been made thus far of the entrance fees to these parks. In each study, part of the visitor costs were classed as "other," or in addition to food, lodging, transportation. Presumably entrance fees were included here. While precise information is lacking from these studies, it is known from other sources that entrance fees at the time averaged less than $1.00 per person, at least for short visits.

The foregoing approximations to demand curves for the total recreational experience still do not directly answer the question, what is the value of the recreation opportunity per se? The costs incurred for the total recreation experience are for items other than rent on the recreation site, except as the latter finds small expression in the entrance fees. The costs are for food, lodging, travel, and miscellaneous items. I have suggested that the use of these various areas has expanded to the point where the value of the recreation site, *at the margin,* is zero, or as near to it as the entrance fees are to zero. This is one point on the demand curve for the site itself. How may the demand curve for the recreation site

per se be derived from the demand curve for the total recreation experience?

To estimate this we must make two assumptions. First, we assume that users of the parks would view an increase in entrance fees rationally—that is, that they would regard it as no more serious than any other equally large increase in total cost of visiting the park. At the same time it is recognized that since most parks, including the national parks, are publicly owned, many users might attempt to influence the level of entrance fees by political or other methods that they would not try to employ against an increase in the price of gasoline, or of meals, or of lodging. Second, we assume that the experience of users from one location zone provides a measure of what people in other location zones would do if costs in money and time were the same. That is, in the Yosemite case, we assume that the people in Los Angeles county would use Yosemite to the extent the people in Merced county

TABLE 3.—Estimated Effect of Rais

Area of origin	Actual visits, 1953 (1,000)	Estimated cost per visit, pres. entrance fees $	Entrance fees raised by $3 per person	
			Estimated visits [1] (1,000)	Added fee revenue [2] ($1,000)
California Zone 1	35	16.65	14	42
2	114	20.40	77	231
3	143	27.05	119	357
4	119	29.05	111	333
5	245	42.25	234 [3]	702
Subtotal	656		555	1,665
Other states				
Zone 1	26	66.50	22	66
2	19	85.00	23	69
3	35	132.50	31	93
4	66	180	59	177
5	40	227.50	42	126
6	51	284.50	48 [3]	144
Subtotal	237		225	670
Total [4]	893		780	2,335

[1] These were calculated from figure 2 and table 1. The estimated number of visits for a specified entrance fee was estimated from the appropriate curves in figure 2, and this number multiplied by the number of people in the distance zone as shown in table 1.

[2] This ignores the small decrease in revenue due to fewer visitors at the original entrance fee

actually now use it, were money and time costs the same. Demand curve analysis almost always requires a transfer of experience from one group of people to another, or from one time to another, and in this respect our demand curve is no different than one for eggs or oranges. In a country with as large a degree of common culture and as much mobility of individuals as the United States, an assumption of similar response to time and money costs is highly reasonable. If the cost of visiting Yosemite were to fall to $20.00 for residents of New York City, it would take them a little time to make the same response as people in nearby California counties now do, but one might hazard the guess their adjustment would be fairly prompt.

On the basis of these two assumptions, the effect of an increase in fees can be estimated for Yosemite from the data in figure 2 and table 1 (table 3). At the existing level of fees, the people in California zone 1 could visit the park for an average cost per visit of

ENTRANCE FEES TO YOSEMITE NATIONAL PARK, 1953

Entrance fee raised by $5 per person		Entrance fee raised by $10 per person		Entrance fee raised by $20 per person	
Estimated visits [1] (1,000)	Added fee revenue [2] ($1,000)	Estimated visits [1] (1,000)	Added fee revenue [2] ($1,000)	Estimated visits [1] (1,000)	Added fee revenue [2] ($1,000)
11	55	7	70	4	80
64	320	47	470	33	660
108	540	90	900	68 [3]	1,360
102	510	86	860	67 [3]	1,340
224 [3]	1,120	208 [3]	2,080	161 [3]	3,220
509	2,545	438	4,380	333	6,660
20	100	17	170	13	260
22	110	20	200	17	340
30	150	30	300	27	540
59	295	59	590	57	1,140
41	205	41	410	39	780
48 [3]	240	48 [3]	480	46 [3]	920
220	1,100	215	2,150	199	3,980
729	3,645	653	6,530	532	10,640

[3] Since these estimates involve extrapolation beyond the extent of the curves, they perhaps have a larger margin of error than the other estimates.

[1] Total of these areas only. In addition, there were some visits from other California counties and from outside of the continental United States.

$16.65; if the fees were $3.00 per visit higher, then the average cost would rise to $19.65, the number of visitors per 100,000 of base population would fall from 50,000 to 20,000 (not shown in table 3), and the total number of visitors from this zone would fall to about 14,000. The new estimated number of visitors at this cost per visit was estimated from figure 2. If the entrance fee were raised by $5.00 per visit, total cost per visit would be $21.65; the number of visits per 100,000 base population would fall to about 15,700, and total visits would be 11,000. A comparable lot of estimates could be made for each other distance zone, and for each other increase in fees.

The new number of visits per 100,000 population, after fees are raised, in each case must be multiplied by the base population of each distance zone to get a new number of visits. An increase of $3.00 in the entrance fee per person would reduce total visits to Yosemite about 13 per cent; one of $5.00, nearly 19 per cent; one of $10.00, 27 per cent; and one of $20.00 about 40 per cent. The reduction is greatest, relatively and in absolute terms, from California; and within California, most from the nearer areas. This is because the various increases in fees are relatively greater, compared to other costs of visiting the park, the nearer one lives to the park.

Revenue from entrance fees continues to mount as the fee is increased. This is because the increase in fee is, generally speaking, such a small percentage of the total cost of visiting the park.

From the data on estimated numbers of visits at each level of increased fees, it is possible to construct a new demand curve (figure 4). This measures the relation between number of visits and entrance fees. It is my contention that this approximates the true demand curve for the recreation opportunity itself. It shows the relationship between price per unit and number of units, all other factors remaining unchanged. It is, of course, subject to all the inadequacies of the data on which it is based, which have been discussed. Yet, it is possible that this curve is closer to the true one than the previous curves are to their true demand curve; if the relationship among the various cost and use factors is at all as has been estimated, then the demand curve for the recreation site per se may be fairly accurate.

Similar estimates can be made for the other three national parks considered (table 4). The curves for the four parks are markedly similar; each is highly inelastic. The entrance fees are such a small part of the total cost that relatively large increases in them are still only small increases in the total cost of the total recrea-

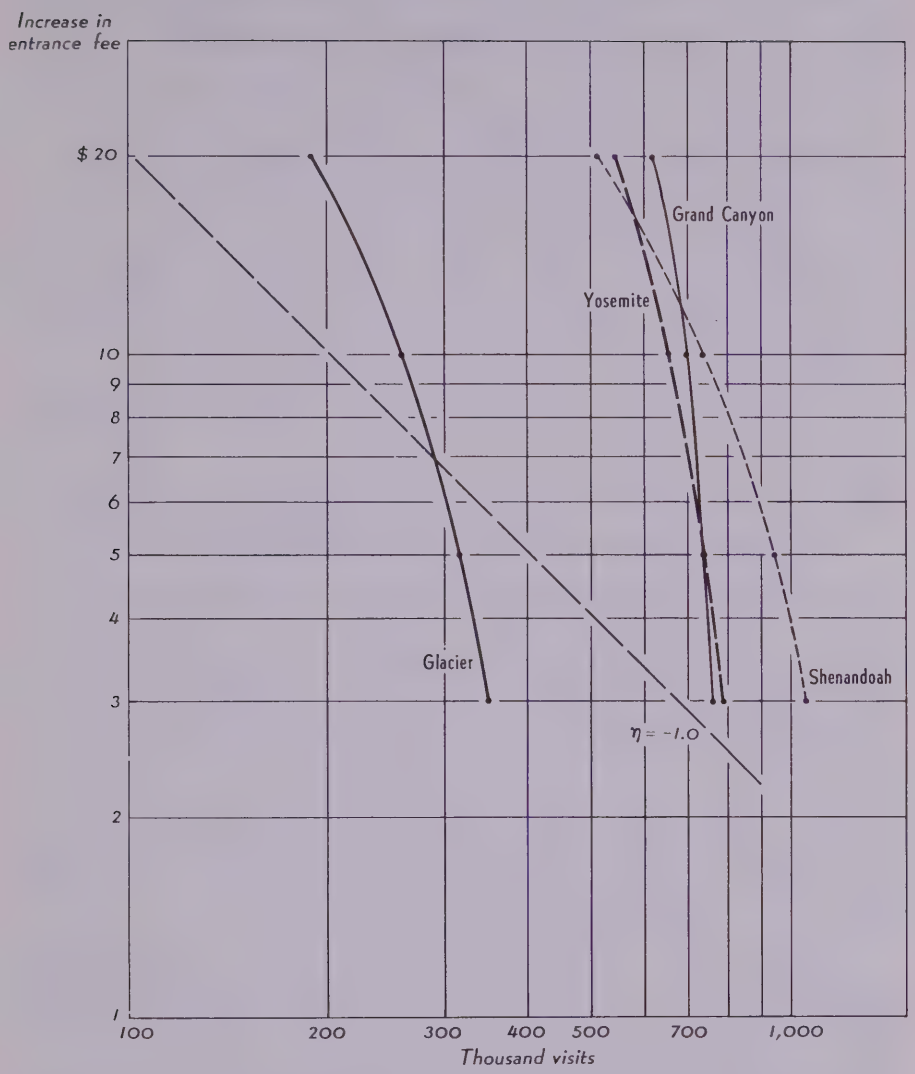

Figure 4. Estimated effect of entrance fees on visits to selected national parks.

tion experience. This is, I repeat, on the assumption that users view these fee increases rationally.

In this example it has been assumed that the entrance fee per visit is raised by the assumed amount. It would be possible to have much more complex systems of entrance fees. For instance, a season admission at a price not much above a single admission would greatly lower the cost per visit for nearby residents who might visit a park several times a year, while having little or no

TABLE 4.—Estimated Visits for Specified Increases in Entrance Fees, Three National Parks

(1,000 visits)

Increase in entrance fee	Grand Canyon	Glacier	Shenandoah
$3.00	759	344	1,065
5.00	737	318	926
10.00	696	257	728
20.00	617	185	518
Actual visits, present fee	799	403	1,499

effect upon distant visitors who would come only once during the season in any case. Many alternative fee systems are possible.

Moreover, while the effect of a new schedule of fees can be estimated by the techniques outlined herein, in practice it would be possible to experiment with different fee systems and ascertain the exact effect of different fees upon amount of attendance and thus upon total revenues. It would not be necessary to make entirely accurate, advance guesses. The effect of different fee schedules might vary, or at least their public acceptance might vary, depending in part upon how it was proposed to use the additional revenues. If viewed as a general revenue measure, there might be much opposition; but if the additional revenues could be used to build better facilities and to provide more services in the park, many people might pay them more willingly.

In these examples, it has been assumed that the entrance fee is raised only in the park in question. One consequence of higher entrance fees for one park would be to shift some of its use to other nearby park or recreational areas. If the entrance fee to Yosemite national park were raised, some of those who would no longer use it would turn to other national parks, to national forests, to state parks, or other areas not too distant. If the entrance fees for all outdoor areas were raised at the same time, and to more or less the same degree, this substitution of one area for another would not occur, or would be less. There would some tendency to substitute other forms of recreation for such recreation.

It is impossible to estimate the point at which the fees for these four national parks would produce the maximum total revenue. This is because we do not know what will happen when costs are raised much above our past experience with them; in

tables 3 and 4, it has been necessary to extrapolate the data to some extent, and this would grow more serious if estimates were made for much higher fees. It does seem clear, however, that if the objective were maximum revenues to the owner of the park then fees should be well above the $20.00 per visit level.

It should also be pointed out that as fees were raised and visits to the park decreased, gross expenditures by visitors, and presumably also the value added locally, would decline about in proportion to the decrease in numbers of visits. Those who sell goods and supply services to park visitors obviously want to see the maximum volume of business, and this means entrance fees as near zero as possible. However, if it is desired to make the park self-supporting, in the sense that entrance fees pay for costs of administration, then fees at a higher level are necessary. If the objective were to yield a monopolist's profit on the park—which presumably it never would be for a publicly owned area—then fees at a much higher but unknown level would be required.

Caution about the possible inaccuracies in the curves of figures 2, 3, and 4 should be re-emphasized at this point; but even if these curves are fully accurate, the results for these areas do not necessarily apply to other areas. In fact, one would expect that other areas, with other tributary populations, other appeals to the general public, other costs of reaching them, might have a very different relationship between level of fees and expected revenue.

It is well to remind ourselves again of such demand curves, assuming that the very best ones have been estimated. They apply to a single point, or year, in time. In a few years, the basic factors underlying them might change considerably. The numbers of people might rise, perhaps unevenly in the various distance zones; average per capita real incomes might also rise; better roads might reduce travel time and otherwise lower costs; and more leisure would permit a higher volume of visits. It is more than possible that tastes or desires of the population for a particular recreation experience will change also. If by some miracle the cost of getting to Yosemite of any other national park fifty years ago could have been reduced, in real terms, to its present-day level, the expansion in use to present levels would not have occurred so rapidly. It takes time for people to learn about specific recreation opportunities, as well as about recreation in general.

However, it might well be possible to make studies of the same area at intervals of a few years, and ascertain the extent of the shift in the demand curve. By studying areas of generally similar characteristics, economic as well as physical, but in different

stages of development, it might be possible to form some idea of the extent of the shift in demand as more people live in tributary area, as their incomes rise, as transportation improves, or as other factors change.

Moreover, it should not be asumed that these curves are so fixed as to be beyond influence. Through more investments in facilities the whole recreation experience might be improved, and thus more people come to the area, or those who come might be willing to pay higher entrance fees, or some of both. Better roads and other travel facilities would have the same general effect. The total recreational experience might be upgraded by various measures outside of the chief recreation area, and thus make the whole experience more enjoyable and its participants willing to pay more for it. In some instances, advertising might bring the virtues of an area to the attention of more people, and thus lead to heavier uses or make higher fees possible.

Consumer's Surplus in Outdoor Recreation

The fourth general idea to explore is that of consumer's surplus in outdoor recreation. Since some people would be willing to pay more for outdoor recreation than they in fact are forced to pay, they enjoy some measure of surplus.

The general nature of consumer's surplus is evident from figure 1. At any given price, the marginal unit purchased provides its purchaser with just enough satisfactions or benefits to make him consider it worthwhile. But some purchases yield satisfactions greater than their costs. In the figure, if the price is $1.00, the 400th unit returns just enough to make it worthwhile; but each previous unit has some surplus, the amount increasing to the earlier units. If the price is $2.00, then the 200th unit is just marginal, and earlier units have a surplus, but a smaller one than before. It is obvious, I hope, that consumer's surplus has meaning only in relation to a volume of purchases and only in relation to a demand curve.

Under a scheme of discriminatory pricing, a monopolist might somehow manage to separate his potential customers or market into groups or segments, and to exploit each to the limit of its willingness to pay. In the figure, it might be possible to sell 100 units at $4.00 each to some selected customers; another 100 units at $2.00 each to another 100 selected customers; a third 100 units at $1.33 to a third selected lot of customers; and the last 100 units for $1.00 each. Under these nearly ideal (from the monopolist's viewpoint) conditions, he would receive $600 in total *more* than if

he sold the whole lot at the marginal price of $1.00 each—a truly handsome profit! To the extent that anything like this is possible, the monopolist would reap for himself the consumer surplus. In practice, pricing of this sort would probably but not always be illegal; perhaps more important, it would be extremely difficult if not impossible to separate the total market so neatly in segments from each other of which a different price could be extracted.

In the case of the Yosemite park relationships shown in figure 2, it appears that some people have a consumer's surplus. For instance, from Merced County there were about 50,000 visits per 100,000 of total population. We do not know how many different individuals this represents, but for the present purpose it does not matter—a visit other than marginal can yield a surplus whether it is to a different person or merely another visit for the same persons. This number of visits was possible only because the cost per visit was slightly less than $17.00. For the marginal visit, this was the total value. However, for the 40,000th visit, or for one of even higher priority, a larger total cost would have been incurred if necessary. For as few as 5,000 visits per 100,000 of population from this county, as much as $41.00 per visit would have been paid, if necessary, assuming again that Merced County people react as do people elsewhere. Some people could afford such a cost, but it would limit their visits greatly. The difference between the approximately $17.00 it did cost them and the $41.00 they would have paid if necessary, represents consumer's surplus for the smaller group of people. Other calculations could be made, for other prices or costs, other numbers of visits, etc. In general, consumer's surplus is equal to monopolist's possible gain; to the extent the latter is realized, it reduces consumer surplus. In practice, it is hard to see how consumer's surplus can be captured, by either public or private provider of recreation.

In fact, the usefulness of estimating consumer's surplus is questionable in any situation. Under almost any circumstances some users of outdoor recreation will gain more from it than they would have been willing to pay if necessary. This may be taken for granted; but how can you capture it, would public policy permit you to try, and what is to be gained from estimating its amount?

Application of Economic Analysis to Recreation

Suppose that the proposal were made to develop a multiple-purpose water project, and the recreational possibilities thereof were to be evaluated; or suppose that a proposal was made to acquire and develop a new park, and that an economic appraisal

was required. Assume further that we had ideal data, or that we had sufficient resources and time in which to collect the best possible data. What kinds of analyses would we make, and what kinds of results might we reasonably hope for? In what ways would our analyses aid decision makers? Let me briefly attempt to answer these questions.

First of all, the physical alternatives of the resources should be considered and described in some detail. If the reservoir is built, what kind of swimming, boating, fishing or other recreation would it provide? What would be especially attractive about the area, for recreation, and what would be least attractive, and how important is each? How much fluctuation will there be in water level? How much impurities will the water have, and of what kind? What about fishing? In what alternative ways might the area be developed? What would be the approximate costs of each? A clear but imaginative understanding of the area is the basis on which all later analysis must rest, and care should be taken by competent and experienced recreation specialists to get this understanding.

Second, the social and economic setting of the proposed recreation area should also be considered in detail. How many people, by distance or time zones, live in its probable tributary area? What are their average incomes, and what else of a socio-economic character is distinctive about them? What are the alternative recreation possibilities in the same general area, now or prospective, that are or might be competitive with the proposed new area? How far, and for what groups of potential users, are the alternative areas fully substitutes for the proposed new area? How far would the latter draw users from established areas, and to what extent would it have a distinctive and new clientele? These are the kinds of questions that should be examined, largely on a descriptive basis. The trends in all these factors, as well as their present levels, should be studied.

Thirdly, the cost of actually using the proposed new area, for different types of uses, should be estimated for users from different residence zones. Such estimates necessarily will be rough, but they should be as good as possible. Money costs are needed, of course, but also time and other costs and possible benefits. These estimates of cost should be prepared for relevant and distinguishable zones of potential users. Ideally, estimates should be prepared for perhaps as many as ten zones, estimated ultimately to have more or less equal numbers of potential users.

Fourth, demand curves must be estimated for the most nearly similar other areas that can be found. The similarity should be

both physical and economic, if possible. Since complete similarity is usually impossible, several moderately similar areas may have to be studied.

Demand curves for other similar recreation areas should proceed by the two-stage analysis illustrated herein—that is, first for the total recreational experience, then for the recreation site per se. To get the first, questionnaires should be used to obtain information from users of the similar areas. Such questionnaires should get enough information on monetary costs to permit calculation or estimation of the cost per family for the recreational experience as a whole, and from this an average cost per member of the family included in the recreational experience could be calculated. This information might be obtained directly and frontally, by simply asking the total spent on the trip, or asking it by major items of expense, or it might be approached indirectly by getting information as to number of days, kind of accommodations used, place of meals, kind of travel facilities, and the like, from which details summary estimates could be prepared. The number of persons per car greatly affects the travel cost per person. These data should surely be tabulated for visitors from each of several distance zones. In addition to averages, it might be enlightening to construct frequency distributions of cost per visitor per day, and to explain as far as possible some of the reasons for variations.

Data should surely be obtained as to the purpose of the visitors in undertaking the total recreational experience of which the visit to the particular study area was a part. Was it the sole reason, or the primary reason, or one among several approximately equally important reasons, or a minor reason, or largely an incident to the primary purposes of the trip? Surely questions could be devised that would throw considerable light on this matter. And the information could be analyzed according to the importance the user gave to the particular area.

Data should also be obtained on the socio-economic characteristics of the recreationists. The number of persons in the total family, their ages and sexes, the number who came on this trip, the occupation of the worker or workers, the approximate income level of the family, and perhaps other items of information are desirable. Frequency distributions of all of these data, by distance zones from the recreation area, should be constructed. And the relation of some of these data, such as income, to some of the previously described data, such as expenditure per day per person, should be explored.

Lastly, such studies should get as much data as reasonably convenient about time—time on this trip, total paid vacation time,

how other recreation time was used, etc. And information about travel would be desirable—total distance, average distances per day, and whether the family regarded the travel as enjoyable, merely tolerable, or endured only for the sake of later recreation, etc.

For any recreation demand studies of this general type, a necessary preliminary step is to define the potential tributary area, and to divide it into a number of zones with roughly equal total population. These zones should be readily distinguishable and definable—the kind of names and areas that respondents would either think of or recognize. Some compromise between easily definability and ideal numbers and populations may be necessary. Ideally, as many as ten zones, with roughly equal base populations, should be established, and all the data collected analyzed for each zone. One major disadvantage of some of the studies consulted in the present study is that state of residence is too crude a classification by distance.

On the basis of data collected, the two types of demand curves illustrated could be calculated for each area studied, following roughly the procedure outlined herein. The collection of necessary data may be time-consuming and expensive, but if the studies are properly designed, its analysis according to the present framework is relatively simple and inexpensive.

If data are collected as suggested, the relationship between cost per visit and number of visitors per 100,000 of population could be calculated. In addition, it would be possible to test for the effect of time and distance upon demand for the area. It is entirely possible that long distances and long travel times have an effect in addition to their cost in monetary terms. It would also be possible to estimate the effect of income and perhaps of other socio-economic characteristics of the visitors, upon demand for this particular recreation area. If the various socio-economic data were defined in ways similar to those used in the census and other massive sources of data, then it would be possible to go from the sample to the larger universe from which it was drawn.

One major question may be faced in the analysis of the data collected. For some kinds of areas, there will be little or no question; the visit to it was the chief purpose of the trip, and all costs and all gains, monetary and personal, are due to the one area. For the more distant and major areas, such as the larger national parks, some of the visitors, probably the more distant ones, visited other areas or had other purposes than to visit the area under study. It will be recalled that this problem was encountered in the study reported herein. Two possible methods of dealing with this situ-

ation exist. One would be to limit the analysis to those users who said their visit to the area was the principal purpose of their trip. Presumably, this would yield a clearly defined demand curve for them. If such people were half of the total visitors coming from a distant residence zone (the other half having supplemental purposes in mind), then the number of visits per 100,000 of base population should be calculated on the basis of half the base population. On the other hand, total demand would have to be calculated on the basis of the entire population in each zone. It could be argued that others, who took in other attractions, shared the costs in a way that made their visit to the area under study comparable to those with equal costs who made it the sole purpose of their trip. The other possibility would be to attempt some allocation of costs and values among the various areas visited on the trip as a whole, and to relate only those costs chargeable against the particular area to the numbers of persons who used it and other areas jointly.

Fifth, on the basis of these studies for the various sample areas, estimate both types of demand curves for the area being planned, and for different methods of developing and managing it. This necessarily must involve a large degree of judgment. If the other areas studied are closely similar, then the demand curves for them can be taken over with only minor modifications. If, as is more probable, they differ in one or more respects, then major modifications of other relationships are necessary. This problem of transferring known experience from one area and set of conditions to a new, and as yet untried area, is by no means peculiar to recreation planning. It certainly enters in agricultural planning. It is unavoidable. The only course is to do it as consciously and carefully as possible.

Lastly, for each major method of developing and managing the proposed new recreation area, and for a considerable range in entrance fees for each, calculate: the number of estimated visits, by zone of origin; the probable total expenditures by all visitors; the value added locally and within the state, by their expenditures; and the total fee revenue. There might be as many as four or five different methods of developing and operating the area, depending upon its physical possibilities, and as many as four or five different fee schedules for each. The latter would provide estimates of total revenues or total monetary values of the recreation per se. If the earlier steps have been carried out well, this type of estimating is neither particularly difficult nor very costly; it follows from the demand schedules and related data.

These alternative physical plans and alternative financial plans would provide several real alternatives for public action. This particularly would be the case when similar plans were available for other areas, so that the comparative advantage of developing one area could be compared with another.

From the second type of demand curve it might be possible to calculate the level of entrance fees and method of development and management of the area that would yield the maximum net revenue to the owner of the area. This would certainly provide one basis of comparison with other possible uses of water and other resources in the same area. It is true that these resources are not always used for other purposes in the way to produce the greatest possible revenue—power is frequently sold at less than the maximum revenue, irrigation water is made available at cost, flood control is nearly free, etc. It could be argued that, if entrance fees are lower than those that will produce maximum revenue, this difference is a cost of socially desired actions. Again, in this respect recreation would be similar to water, power, flood control, and other resource programs—in various of them, prices are established well below the maximum revenue point, for social objectives.

It is assumed that, in practice, entrance fees for a new recreation area will be established below the maximum rent point. Other criteria will be used. One objective might be to establish fees such that the revenues therefrom would pay the cost of maintenance and management of the area; this level of fees could be estimated by the procedure outlined. It would also be possible, whatever the level of fees advocated or adopted, to show who gained, and by how much, from fees other than at the maximum revenue point.

The steps outlined above do not result in a neat, single, unequivocal answer as to the "best" plan of development or management of the proposed new recreation opportunity. It is, in fact, highly unrealistic to expect any method of analysis to provide final answers to all the questions. More, it may be argued that those who ask (and reasonably so) for better methods of economic analysis of recreation, would be the first to reject a mechanical and unequivocal approach. What the above procedure would do is to provide reasonably clearcut alternatives of public policy and action, with a clear statement of costs and benefits from each. Policies and programs for recreation must still be decided on the basis of judgment and intangibles, but with tools such as these, imperfect as they may be, the decision maker will have a far better picture of the real alternatives and their costs than has been possible in the past.

the sole reason for the trip, but would share some of the costs with other (unknown but presumed) objectives of the trip.

5. I would place more emphasis on time as a cost.

6. I would emphasize the system aspect of outdoor recreation areas, pointing out more clearly that the demand for any site is influenced by the availability of other sites and their characteristics.

7. Lastly, I would attempt a more elegant formulation, in mathematical terms, which would explicitly include many other variables such as income, age, occupation, and other personal characteristics of users and various physical characteristics of the recreation area itself.

Readers interested in other studies using the distance-volume approach outlined in this reprint will find ten studies listed on pages 48 and 49 of *Economics of Outdoor Recreation.* Later studies, many of which contain bibliographies, are listed below:

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Greater London Council, *Surveys of the Use of Open Spaces,* vol. 1, Research Paper no. 2, Greater London Council, Planning Department, County Hall, London, September 1968.

Leonard Merewitz, "Recreational Benefits of Water Resource Development," *Water Resources Research,* vol. 2, no. 4, 1966.

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Peter H. Pearse, "A New Approach to the Evaluation of Non-priced Recreational Resources," *Land Economics,* vol. 44, February 1968.

David W. Seckler, "On the Uses and Abuses of Economic Science in Evaluating Public Outdoor Recreation," *Land Economics,* vol. 42, November 1966.

Robert J. Smith and N. J. Kavanagh, "The Measurement of Benefits of Trout Fishing: Preliminary Results of a Study at Grafham Water, Great Ouse Water Authority, Huntingdonshire," *Journal of Leisure Research,* vol. 1, no. 4, Autumn 1969.

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36. MINERAL IMPORT AND STABILIZATION POLICIES, by Orris C. Herfindahl. Presented at the American Institute of Mining and Metallurgical Engineers Meeting, Society of Mining Engineers Minerals Economics Program, New York, February 19, 1962; 25 cents.
66. THE LEAD-ZINC ANOMALY, by David B. Brooks. Reprinted from *Transactions* (Society of Mining Engineers), June 1967; 25 cents.
74. NUCLEAR POWER IN EAST EUROPE, by Jaroslav G. Polach. Reprinted from *East Europe,* May 1968; 25 cents.
75. LATIN AMERICAN URBANIZATION: PLAN OR PROCESS? by Lowdon Wingo. Reprinted from *Shaping an Urban Future,* by Bernard J. Frieden and William Nash, The M.I.T. Press, 1969; 25 cents.
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80. PERVASIVE EXTERNAL COSTS AND THE RESPONSE OF SOCIETY, by Allen V. Kneese and Ralph C. d'Arge. Reprinted from *The Analysis and Evaluation of Public Expenditures: The PPB System,* A compendium of papers submitted to the Subcommittee on Economy in Government of the Joint Economic Committee, 91 Cong., 1 sess., (1969); 25 cents.
81. NEGOTIATION AND LAND CONVERSION, by George M. McBride and Marion Clawson, Reprinted from *Journal of the American Institute of Planners,* January 1970; 25 cents.
82. A NEW POLICY DIRECTION FOR AMERICAN AGRICULTURE, by Marion Clawson. Reprinted from *Journal of Soil and Water Conservation,* January-February 1970 (vol. 25, no. 1); 25 cents.
83. RELATIVE IMPORTANCE OF VARIABLES IN WATER RESOURCES PLANNING, by I. C. James II, B. T. Bower, and N. C. Matalas. Reprinted from *Water Resources Research,* December 1969 (vol. 5, no. 6); 25 cents.
84. COALITIONS, MINORITY REPRESENTATION, AND VOTE-TRADING PROBABILITIES, by Edwin T. Haefele. Reprinted from *Public Choice,* Spring 1970; 25 cents.
85. THE DEVELOPMENT OF ENERGY IN EAST EUROPE, by J. G. Polach. Reprinted from *Economic Developments in Countries of Eastern Europe,* a compendium of papers submitted to the Subcommittee on Foreign Economic Policy of the Joint Economic Committee, 91 Cong. 2 sess., (1970); 50 cents.
86. INTERNATIONAL FLOWS OF ENERGY SOURCES, by Joel Darmstadter. Reprinted from *IEEE Spectrum,* May 1970; 25 cents.
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88. PROTECTING OUR ENVIRONMENT AND NATURAL RESOURCES IN THE 1970's, by Allen V. Kneese. Reprinted from *The Environmental Decade* (*Action Proposals for the 1970's,* hearings before a Subcommittee of the Committee on Government Operations, House of Representatives, 91 Cong., 2 sess., (1970); 25 cents.
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